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Quarterly News Bulletin of the Humboldt County Air Pollution Control District

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AIR RULES EFFECTIVE JANUARY 1, 1970

Starting with the new year 1970, all the Rules and Regulations of the Humboldt County Air Pollution Control District became activated. These regulations were enacted by the Humboldt County Board of Supervisors on May 6, 1969. The eight-month period (until January 1970) was provided by the Board for persons to bring their operations within the requirements specified by the Regulations.

The major areas covered by the new air pollution control regulations will include the pulp mill operations, tepee burners, open burning and commercial incineration systems.

The administration of Humboldt County's new air laws is set up as specified in the State of California Health and Safety Code, which states: "Any person who builds, erects, alters, replaces, operates, sells, rents or uses any article, machine, equipment or other contrivance which may cause the issuance of air contaminants must obtain a written authority to construct and a permit to operate from the Humboldt County Air Pollution Control District."

A total of 84 operating permit applications were processed by the Humboldt County Air Pollution Control District during the past year. Eighteen open burning permit applications were denied and 28 operating permits were issued for various phases of the Crown Simpson and Georgia Pacific pulping operations on the Samoan Peninsula. Additional permits were granted for power boilers, hot mix asphalt plants, commercial incinerators and other minor miscellaneous sources as follows:

No. of Permits Issued	Permit Category
21	Power boilers
28	Pulp mill operations
6	Hot mix asphalt plants
9	Commercial incinerators
2	Miscellaneous sources

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BOARD RULES ON OPEN BURNING

The first meeting of the Hearing Board of the Humboldt County Air Pollution Control District was held on November 6, 1969, to review appeals from twelve open burning permit denials issued by Control Officer Charles Sassenrath. It was pointed out at this hearing that air contamination in the Humboldt Bay Basin far exceeded the proposed State of California ambient air standard for particulate matter (75 micrograms per cubic meter, as of November 6), with values frequently above 100 being reported in the major populated areas. The twelve permit reviews constituted a total open burning load of approximately 270 tons per day.

After listening to testimony of the industrial and governmental agencies represented at this hearing, inspection of the major burning sites, and a lengthy review of the arguments presented, the Hearing Board upheld the twelve permit denials. Variances ranging from six to twelve months were granted to all organizations within which time they are to comply with the open burning restrictions -- completely unenforced since their adoption by the Humboldt County Board of Supervisors on August 11, 1964.

Firms issued temporary variances from Rule 53 (Open Fires) were:

Organization	Location	Variance Period
Georgia Pacific Corporation	Samoa	9 months
Georgia Pacific Corporation	Carlotta	9 months
Arcata Redwood Company	Orick	9 months
Cal-Pacific Redwood Company	Orick	9 months
Halvorsen Industries	Alton	9 months
Humboldt Fir Company	Hoopa	9 months
Kramer Lumber Sales Company	Fields Landing	6 months
The Pacific Lumber Company	Scotia	6 months
Duncan Wood Products Company	Garberville	12 months
Sierra Pacific Industries (Humboldt Flakeboard Division)	Arcata	9 months
City Garbage Company	Eureka	9 months
Humboldt County Garbage Disposal	Table Bluff	6 months

The Hearing Board stressed the point that this was not a study period and they expected open burning to be terminated by the expiration date of the variance.

Additional open burning and tepee burner permit denials will be appealed at the next Hearing Board meeting, tentatively scheduled for the latter part of January 1970.

TRS EXPLAINED

A distinguishing characteristic of most Kraft pulp mills is the objectionable odor released to the atmosphere by various process operations during the conversion of wood chips to cellulose pulp fiber. This odor has been described as similar to that of rotten eggs, rotten cabbage and a host of other typical foul-odor sources. Realizing the seriousness of this problem in the Eureka area, the Humboldt County Air Pollution Control Board has adopted new regulations to limit the release of odorous materials into the atmosphere. Rule 57 of these regulations lists the most strict Kraft mill control requirements in effect anywhere in the United States and specifies maximum odor emissions based on mill size and location of the odor-emission point.

Since the odor of a Kraft mill is mainly caused by gases containing sulfur in its unoxidized form, the terminology "total reduced sulfur" (TRS) has been used to collectively group these odorous compounds. Four main sulfur-containing gases are included within this TRS grouping: Hydrogen sulfide (H_2S), methyl mercaptan (MM), dimethyl sulfide (DMS), and dimethyl disulfide (DMDS). All of these gases are known to be extremely odorous, with concentrations of less than 10 parts per billion (ppb) often detectable by the human nose. Individual odor threshold sensitivities may range from 0.2 - 35 parts per billion. The concentration at which a faint odor is detected is called the "odor threshold."

The following table lists the TRS conversion factors and odor thresholds for the four main sulfur compounds released by Kraft pulp mills:

Name of Compound	Abbreviated Notation	(a) TRS Conversion (lb. TRS per lb. gas)	(b) Mean Odor Threshold (ppb)	(b) Range of Individual Odor Thresholds (ppb)
Hydrogen sulfide	H_2S	1.00	4.5	1.0 - 22
Methyl mercaptan	MM	0.71	1.0	0.2 - 3.4
Dimethyl sulfide	DMS	0.55	2.5	0.2 - 9.8
Dimethyl disulfide	DMDS	0.72	7.6	0.9 - 35

(a) TRS is expressed as hydrogen sulfide, not as $S^{=}$.

(b) Wilby, Frank V. Variation in Recognition Odor Threshold of a Panel. Journal of the Air Pollution Control Assoc. Vol. 19:96-100. Feb. 1969.

Air Rules, Continued

We have received 52 requests for tepee burner operating permits which will be processed during the next several months. The 17 tepee burner operators who have not yet submitted their permit applications are requested to do so as soon as possible. Most tepee burners are going to require improvements or modifications before they will be able to meet the increased air pollution control requirements being enacted by government at all levels to meet citizens' demands for a cleaner environment. The cost of these burner improvements and new wood waste utilization processes being developed in the Humboldt Bay Area should make this wasteful disposal method less desirable in the future.

All persons are requested to make a New Year's Resolution to show renewed interest in the fight for clean air and report violations to the Humboldt County Air Pollution Control District. Public response plays a major part in helping to evaluate the effectiveness of present regulations and it points out new requirements for the coming years. Any person wishing to learn more about the activities of this relatively new county department is invited to drop by our offices at 5630 South Broadway or call us at 443-3091.

1969 SUMMARY OF AIR STUDIES

DUSTFALL

In April 1969 the Humboldt County Air Pollution Control District commenced air quality studies and selected fourteen locations for making dustfall measurements, ranging from Orick and Hoopa in the north to Garberville in the south. After collecting and analyzing monthly samples from each location, the extremes of dust and ash fallout were as follows:

Highest value - 87 tons per square mile per month measured at Samoa in October 1969
Lowest value - 3.4 tons per square mile per month measured at Garberville in May 1969 and Ferndale in November 1969
Mean for all stations - 13.6 tons per square mile per month.

HIGH-VOLUME SAMPLING

The high-volume sampling method as specified by APM-2.5 of the Air Pollution Control Association is the most widely used procedure for determination of airborne particulate matter in the atmosphere. The California Air Resources Board has recently adopted air quality standards based on this method for several of the California Air Basins. These standards call for annual mean particulate matter concentrations not to exceed 60 micrograms per cubic meter. Humboldt County measurements to date are summarized on the following page:

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High-Volume Sampling, Continued

Location	(Concentration (micrograms per cubic meter) Started Sampling	High	Low	Mean
Eureka - Downtown	Jan. 69	166	49	91*
Eureka - Gen. Hospital	Oct. 69	78	17	51
Eureka - Ft. Humboldt	Sept. 69	81	18	61*
Eureka - Spruce Point	July 69	60	29	43
Arcata	Aug. 69	162	28	99*
Blue Lake	Sept. 69	158	40	106*
Samoa	Aug. 69	235	39	141*
McKinleyville	Sept. 69	156	91	117*
Orick	Oct. 69	69	25	47
Hoopa	Sept. 69	111	64	88*
Fortuna	Sept. 69	126	38	71*
Ferndale	Sept. 69	68	18	44
Rio Dell	Oct. 69	46	32	39
Garberville	Oct. 69	44	27	36

* Exceeds tentative state standards.

TOTAL SULFATION

Total sulfation determinations by the lead candle method, which give an indication of the total sulfur content in the air, were started in October 1969 in five sample locations encircling the two kraft pulp mills. The maximum value, which was recorded at Fort Humboldt during November, was a very low reading of only 0.09 milligrams per square decimeter per day.

Date	Milligrams of SO_3 per square decimeter per day Eureka	Arcata	Samoa	Ft. Humboldt	Spruce PT.
October 69	0.05	0.06	0.08	0.07	0.05
November 69	0.07	0.07	0.05	0.09	0.08

TOTAL OXIDANT AND NO_2

108 sample runs were made for total oxidant and NO_2 at Eureka, Arcata, Blue Lake, Ferndale, Fortuna and Hoopa. The maximum single hour average values were found at downtown Eureka and Fortuna.

Maximum Oxidant - 0.02 ppm @ Fortuna on 9-5-69
Maximum NO_2 - 0.02 ppm @ Eureka on 10-1-69

Total Oxidant and No_2, Continued

The California state maximum desirable level for oxidant is 0.10 ppm and for nitrogen dioxide is 0.25 ppm. All measurements taken in Humboldt County have given values well below either standard.

SULFUR DIOXIDE

The results of sixty sulfur dioxide determinations made in Eureka and Arcata showed a maximum two-hour average value of only 0.005 ppm, again well below the tentative state standard of 0.04 ppm.

HYDROGEN SULFIDE AND TOTAL MERCAPTANS

Over 1,000 analyses for H_2S and total mercaptans have been made in the Humboldt Bay Basin since June 1969 in order to correlate odor response data with ambient air conditions. All measurements made to date were by methods supplied by the State of California Department of Public Health. The new California standard for H_2S is set at 0.030 ppm for a one-hour average sample. The maximum two-hour average H_2S concentration obtained in Eureka was 0.016 ppm. Although there is no state standard for total mercaptans at present a maximum of 0.033 ppm was obtained in Arcata during the past six months of testing. Both the H_2S and total mercaptan methods have given very erratic results in past studies so starting January 1970 a new flame photometric procedure will also be used to more accurately measure the small concentrations of sulfur compounds in the local atmosphere.

TOTAL ALDEHYDES

Total aldehyde readings were made in Eureka, Blue Lake, Arcata and Hoopa. Consistent high values were found in Blue Lake and Arcata with a maximum of 0.04 ppm recorded in Blue Lake. There is presently no state standard for aldehydes.

CARBON MONOXIDE AND HYDROCARBONS

Ambient measurements of these two pollutants will be started in early 1970 as soon as the required laboratory equipment is obtained.

COMPLAINT SCOREBOARD

The installation of the telephone-recorder system and the recent pleasant fall weather combined to send our complaint report to new high levels for the year. The increased response from persons regarding smoke and fallout shows the ever-increasing public demand for blue skies and clear horizons.

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Complaints, Continued

	September	October	November	December
Smoke	15	32	44	28
Fallout	6	11	28	12
Pulp mill odor	182	212	159	67
Other odor	1	2	4	1
Miscellaneous other	0	2	0	1

A BURNING QUESTION

What is combustion, or burning, as it is usually called? Webster's Dictionary defines combustion as oxidation accompanied by the evolution of heat and light. The evolution of heat and light is obvious, but what does oxidation mean?

Oxidation is a term derived from oxygen, the gaseous element comprising about 21% of our atmosphere and about half of the total material on the surface of the earth. When oxygen combines with another substance, we call the process oxidation. Energy is exchanged during oxidation, and this energy exchange is evidenced by the evolution of heat and light.

Putting all this together, we see that combustion is a combining of oxygen with other substances to produce heat and light. Combustion may be slow, like in the decay of wood. In this case the heat and light evolved are usually too small to be observed without the use of delicate instruments. Or it may be extremely fast, as when gunpowder burns. The most common combustion is somewhere in between in rate -- fire. Oxygen is consumed at a great rate and large quantities of heat and light are evolved in a fire. An empty cardboard box eight inches by ten inches by six inches requires sufficient air for complete combustion to sustain an average individual at moderate work for a period of about 40 minutes. If insufficient oxygen is available to completely burn up the box, it is apparent that part of the box, either unburned or at some stage of partial burning, must remain. It is the partially burned material from incomplete combustions that gives rise to the undesirable effects associated with fires.

A most undesirable effect associated with fires is the production of smoke. Smoke not only dirties most surfaces it comes in contact with, but it may have substances in it that irritate one's eyes or smell bad. If the fire is a large one, there may be considerable fine particulate matter carried aloft to be desposited at some distance. The production of smoke and fine particulate matter are easy to understand. They are simply partially burned material. But what about the bad smelling and eye irritating components? Where do they come from? This is a question concerning a very complicated subject, but the answer involves the basic conditions necessary to have a fire.

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Burning, Continued

First, the product must be combustible. That is, it must be able to unite with oxygen easily. Second, there must be a supply of oxygen available to the product. Notice I did not say sufficient oxygen for complete combustion. Third, a source of heat is necessary to start and maintain the fire. If insufficient heat is available, either from the fire or surroundings, to sustain combustion, it will go out.

The first thing that happens in any fire is the raising of the combustible material to its ignition temperature by some source of heat. The substance then ignites, if oxygen is present, and will continue to burn until one of the three basic conditions for a fire is removed.

Large amounts of heat are liberated in a fire, and this heat decomposes the combustible material, yielding many products. The process is similar to cracking heavy oils to get gasoline. If the products formed from the thermal breakdown of the combustible material can get thoroughly mixed with oxygen in the fire zone, they will probably be oxidized (i.e., burned) to innocuous materials. If there is a deficiency of oxygen so that complete combustion cannot occur, a large number of intermediates to complete combustion can be formed. These products are carried to the relatively cool zone before being mixed with excess air. In the cool zone the temperature is too low for further combustion to occur and these materials are carried into the atmosphere and distributed around the countryside. Products such as hydrocarbons, aldehydes, ketones, acids, carbon monoxide, and complex tars are formed. These materials are responsible for bad smells and eye irritation. A fire does not have to produce smoke to indicate poor combustion, but a smoky fire is one in which combustion is incomplete and these intermediate products are found.

The rapid advance of technology is producing equipment to cope with conditions where fires exhibiting poor combustion are found. On the other hand, some products of the modern age are very difficult to dispose of by burning. I am referring to some plastics, such as vinyls, teflon, and a host of other halogenated substances. This type of material is not only very difficult to burn, but also yields very corrosive, and sometimes very poisonous, gases.

Although burning can usually be started by the simple act of applying a lit match to some combustible material, the combustion itself is far from being simple. Once the fire is started, the next stage is a burning question.

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